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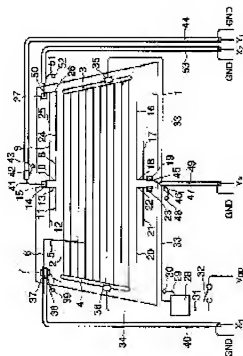
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(54) ON-GLASS ANTENNA FOR AUTOMOBILES

(57)Abstract:

PROBLEM TO BE SOLVED: To properly receive signals in the AM, FM, UHF and VHF broadcast bands in any direction.

SOLUTION: A defogger is used as an antenna for receiving signals in the AM broadcast bands and the FM broadcast bands to the VHF and UHF broadcast bands. An antenna pattern, having conductor wires 17 of a length equal to a quarter wavelength near a high-frequency band of the VHF broadcasting, is disposed on a prescribed blank of the defogger, thereby forming a plurality of diversity antennas for the VHF and UHF broadcasting bands. An antenna pattern, having conductor wires 24 of a length equal to a quarter wavelength near a high-frequency band of the FM broadcasting to the VHF broadcasting, is used as other diversity receiving antennas in the FM broadcast bands.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the glass antenna for cars which outputs the input signal of an AM radio broadcast band, an FM radio broadcast band, and a television broadcasting band from the antenna of the conductive pattern on the rear glass surface of a car.

[0002]

[Description of the Prior Art]Drawing 7 is a lineblock diagram of the conventional glass antenna for cars. 164 is rear glass of a car and 165 and 166 are the conductor wires (heater wires) of a defogger. The defogger pattern is formed in horseshoe-shaped with two or more conductor wires parallel to the conductor wires 165 and 166 which connect the common electrodes 167 and 168 of the both-sides end of a glass surface, and 169.

[0003]The antenna pattern which consists of the conductor wires 170-180 and the power supply terminal 181, The parallel conductor wire 174 which has been arranged at the unfilled space part of the defogger pattern upper part, and adjoined the horizontal conductor wire 165 of the defogger, Connect with the conductor wire 174 with the conductor wire 175 of a left-hand side perpendicular direction, and it has the two parallel conductor wires 173 and 172, . Pass the conductor wire 179 of a short perpendicular direction in the horizontal conductor wire 178 connected to left-hand side through the conductor wire 177 of a perpendicular direction shorter than the center of the horizontal conductor wire 176 parallel to the glass top chord near the window frame of the body. Connect with the top conductor wire 172 among three horizontal conductor wires parallel to the conductor wire of a defogger, and the conductor wire 172 with the conductor wire 171 of a right-hand side perpendicular direction. It connected with the horizontal conductor wire 170 which approached the conductor wire 176 parallel to the glass top chord near the window frame of the body, and has been arranged on right-hand side, and has connected with the power supply terminal 181 with the horizontal conductor wire 180 from the middle of the vertical conductor wire 171.

[0004]182 is a choke coil, and in between, while connected the voltage stabilization capacity 183 and it lets the power source wires 184 and 185 pass for two terminals, The power source wires 187 and 188 which

were connected to DC-power-supply potential V_{DD} via the earth potentials and the switch 186 of the body, respectively, and were connected to two terminals of another side of a choke coil are connected to the two common electrodes 169 and 168, respectively. Heat two or more conductor wires of a defogger, and glass is kept from blooming cloudy with low temperature or humidity, and a switch is turned OFF, when climate is good and does not need to heat. [a switch]

[0005]The signal wire 189 from the inner conductor of the end of the coaxial cable 191 is connected to the power supply terminal 181 of an antenna pattern, The earthing conductor 190 connected to the outer conductor is connected to the nearby body, and the input signal X of an antenna is outputted from the inner conductor by setting the outer conductor of the other end of the coaxial cable 191 to earth-potentials GND.

[0006]This conventional glass antenna for cars is an object for reception of an AM radio broadcast band and an FM radio broadcast band, and since the number of antennas is one, as an object for reception of a television broadcasting band, its characteristic is not enough. It is because a television picture will become ambiguous or will change in the direction of low sensitivity, if the receiving sensitivity of an antenna has directivity in order that a car may take various directions to the transmit radio wave from a broadcasting station.

[0007]

[Problem(s) to be Solved by the Invention]This invention provides newly the glass antenna for cars which cancels the above-mentioned fault which conventional technology has and which outputs the input signal of an AM radio broadcast band, an FM radio broadcast band, and a television broadcasting band.

[0008]

[Means for Solving the Problem]A glass antenna for cars, wherein this invention is provided with an antenna pattern characterized by comprising the following.

An antenna pattern which connected a defogger pattern which consists of two or more parallel conductor wires which tie a common electrode of a both-sides end on a rear glass surface of a car with a conductor wire.

It is in a center section, or the upper right and a left flank of the unfilled space part upper part of a defogger pattern, and the bottom, An antenna pattern which has one fourth of the conductor wires of length of wavelength in glass of a signal of frequency near the high frequency band of one fourth of conductor wires of length and VHF television broadcasting of wavelength in glass of a signal of frequency which is near the high frequency band of VHF television broadcasting from an FM radio broadcast band.

A conductor wire of one fourth of the length of wavelength in glass of a signal of frequency near the high frequency band of VHF television broadcasting.

[0009]

[Function]In this invention, the antenna pattern which connected the defogger pattern with the conductor wire An AM radio broadcast band, From an FM radio broadcast band, use VHF and a UHF television broadcasting band as one antenna to receive, and The unfilled space part upper part of a defogger pattern,

and a lower center section, Two or more antenna patterns which have one fourth of the conductor wires of length of the wavelength in the upper right and the glass of the signal of the frequency which is near the high frequency band of VHF television broadcasting in a left flank are arranged. The antenna pattern which has a conductor wire of one fourth of the length of the wavelength in the glass of the signal of the frequency which is near the high frequency band of VHF television broadcasting from an FM radio broadcast band further is in two or more of the antenna patterns, It is considered as another antenna which receives VHF and a UHF television broadcasting band from an FM radio broadcast band.

[0010]By carrying out diversity reception of the FM radio broadcast band with the two antennas, and carrying out diversity reception of the television broadcasting band with two or more antennas which added the antenna pattern from which a spacial configuration differs at the two antennas, The direction of the low sensitivity of each antenna is compensated mutually, and the antenna of good receiving sensitivity is obtained in every direction of a car.

[0011]

[Example]Drawing 1 is a lineblock diagram of the glass antenna for cars of this invention, and shows the 1st example. 1 is rear glass of a car and 2 is a conductor wire of a defogger. The defogger pattern is formed in the shape of [of the day] a character with two or more conductor wires parallel to the conductor wire 2 to which the common electrodes 3 and 4 of the both-sides end on a glass surface are connected. The antenna pattern which connected the defogger pattern to the power supply terminal 7 with the conductor wires 5 and 6, The antenna pattern which is formed in the flank on the left of [upper part] a defogger pattern and its unfilled space part, and serves as the conductor wires 8, 9, and 10 from the power supply terminal 15 11, 12, 13, and 14, The antenna pattern set to the conductor wires 16, 17, and 18 used as a pair, and 20, 21 and 22 from the power supply terminals 19 and 23, The antenna pattern which is formed in the center section of the unfilled space part upper part of a defogger pattern and the bottom, respectively, and consists of the conductor wires 24, 25, and 26 and the power supply terminal 27 is formed in the flank on the right of [upper part] the unfilled space part of a defogger pattern.

[0012]28 is 182 of drawing 7, and a circuit of the choke coil constituted like 183, in between, while is connected and voltage stabilization capacity lets the power source wires 29 and 31 pass for two terminals, respectively, It connects with DC-power-supply potential V_{DD} via the earth potentials and the switch 32 of the body which are shown by 30, It has connected with the two common electrodes 3 and 4 through the coils 35 and 36 which are higher than the frequency near the low frequency wave of an FM radio broadcast band, and carry out self resonance of the power source wires 33 and 34 linked to each of two terminals of another side of a choke coil on frequency lower than high frequency band VHF_H of VHF television broadcasting.

[0013]The antenna pattern which connected the defogger pattern with the conductor wire, The vertical common conductor wire 5 connected with two or more conductor wires parallel to the horizontal conductor wire 2 to which the common electrodes 3 and 4 of the both-sides end of a defogger are connected, and it connected with the horizontal conductor wire 6 parallel to the glass top chord near the window frame of the body, and has connected with the power supply terminal 7 of a left flank. The length of the horizontal

conductor wire where the vertical common conductor wire 5 divides internally almost equally two or more conductor wires between the common electrodes 3 and 4 of the both sides of a defogger, and carries out common connection and which is between the common conductor wire 5 and the near common electrode 4, The length of the common conductor wire 5 is the one fourth of length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H (170-222 MHz) of VHF television broadcasting, i.e., the length which multiplied one fourth of the wavelength in the air by the fractional shortening of glass, and is made into $1/6.2$ of the length of the wavelength in the air.

[0014]A UHF television broadcasting band (470-770 MHz), Are by about 3 times the frequency of high frequency band VHF_H of VHF television broadcasting, and the length of the horizontal conductor wire

between this common conductor wire 5 and common electrode 4, and the length of the common conductor wire 5, It is equivalent to three fourths of the length of the wavelength in the glass of the signal of the frequency near a UHF television broadcasting band, and $3/6.2$ of the wavelength in the air of length.

[0015]The length of the common electrodes 3 and 4, the top of a defogger, and the interval between the bottom horizontal conductor wires a defogger pattern, By the about $1/4$ length of the wavelength in the glass of the signal of the frequency near low frequency band VHF_L (90-108 MHz) of VHF television broadcasting, and the about $1/6.2$ length of the wavelength in the air. The horizontal conductor wires between the common electrodes 3 and 4 are the length of $1/2 - 3/4$ of the wavelength in the glass of the signal of the frequency which is near low frequency band VHF_L of VHF television broadcasting from an FM radio broadcast band (76-90 MHz), and the length of $1/3.1 - 3/6.2$ of the wavelength in the air.

[0016]The input terminal of the circuit 37 is connected to the power supply terminal 7, and the signal wire from the inner conductor of the end of the coaxial cable 40 is connected to the output terminal of the circuit 37, Connect the earthing conductor 38 connected to the outer conductor to the body shown by 39, and the outer conductor of the other end of the coaxial cable 40 is set to earth-potentials GND, Input-signal X_1 of an AM radio broadcast band (0.5-1.6 MHz), an FM radio broadcast band and a VHF television broadcasting band, and a UHF television broadcasting band is outputted from the inner conductor.

[0017]The antenna pattern of the upper part center section of the unfilled space part of a defogger pattern has the equal length of the horizontal conductor wire 8 parallel to the conductor wire 2 of a defogger, and the conductor wires 10 and 13 of 11, 9, 12, and a perpendicular direction, and is carrying out symmetrical composition to the power supply terminal 15.

A right pattern connects the horizontal conductor wires 8 and 9 with the vertical conductor wire 10, It connected with the power supply terminal with the horizontal conductor wire 14 along the lower side of the power supply terminal 15, and the left pattern connected the horizontal conductor wires 11 and 12 with the vertical conductor wire 13, and has connected them to the power supply terminal 15 with the horizontal conductor wire 14.

[0018]The conductor wires 8, 9, and 11 and 12 are one fourth of the length of the wavelength in the glass of

the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the length of the wavelength in the air, The length which added two conductor wires of 9 and 12 of both sides is $1/6.2$ of $1/4$ of the wavelength in the glass of the signal of the frequency near low frequency band VHF_L of VHF television broadcasting, and the wavelength in the air from the FM radio broadcast band. Connect the earthing conductor 42 which connects the signal wire 41 from the inner conductor of one end of the coaxial cable 44 to the power supply terminal 15, and is connected to the outer conductor to the body shown by 43, and the outer conductor of the other end of the coaxial cable 44 is set to earth-potentials GND, Input-signal Y_1 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0019]The antenna patterns of the bottom center section of the unfilled space part of a defogger pattern are a pattern of the right which consists of the conductor wires 16, 17, and 18 and the power supply terminal 19, and a pattern of the left which consists of the conductor wires 20, 21, and 22 and the power supply terminal 23, and are constituting the symmetrical dipole antenna.

The conductor wire 16 parallel to the horizontal conductor wire of the bottom of a defogger used as a horizontal pair and the length of 20, 17, and 21 are equal respectively, and the length of the two horizontal conductor wires 16, 17, and 20 and the vertical conductor wires 18 and 22 which have connected 21 to the power supply terminals 19 and 23, respectively is equal.

[0020]One fourth of the length of the wavelength in the glass of the signal of the frequency which has the conductor wires 16 and 20 near low frequency band VHF_L of VHF television broadcasting from an FM radio broadcast band, $1/6.2$ of the length of the wavelength in the air is used, and the conductor wires 17 and 21 are made into one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length. The signal wires 45 and 46 from the inner conductor and outer conductor of an end of the coaxial cable 49 are connected to the power supply terminals 19 and 23, respectively, The earthing conductor 47 connected to the outer conductor is connected to the body shown by 48, and input-signal Y_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor by setting the outer conductor of the other end of the coaxial cable 49 to earth-potentials GND.

[0021]The antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern has connected the two horizontal conductor wires 24 and 25 parallel to the conductor wire 2 of a defogger to the power supply terminal 27 with the conductor wire 26 of a perpendicular direction parallel to the glass side near the window frame of the body. The conductor wires 24 are one fourth of the length of the wavelength in the glass of the signal of the frequency which is near high frequency band VHF_H of VHF television broadcasting from an FM radio broadcast band, and $1/6.2$ of the wavelength in the air of length, One fourth of the length of the wavelength in the glass of the signal of the frequency which is near low

frequency band VHF_L of VHF television broadcasting from an FM radio broadcast band especially, and $1/6.2$ of the wavelength in the air of length are used. The conductor wire 25 is made into one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length.

[0022]Connect the earthing conductor 51 which connects the signal wire 50 from the inner conductor of one end of the coaxial cable 53 to the power supply terminal 27, and is connected to the outer conductor to the body shown by 52, and the outer conductor of the other end of the coaxial cable 53 is set to earth-potentials GND, Input-signal X_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0023]The choke coil of the circuit 28 of a choke coil, With an AM radio broadcast band, impedance is high and Frequency lower than high frequency band VHF_H of VHF television broadcasting, For example, the coils 35 and 36 which carry out self resonance on the frequency which is near low frequency band VHF_L of VHF television broadcasting from near an FM radio broadcast band, By low frequency band VHF_L of an FM radio broadcast band and VHF television broadcasting, impedance is high and in high frequency band VHF_H and the UHF television broadcasting band of VHF television broadcasting. With the impedance of the coils 35 and 36, and the impedance of the power source wires 33 and 34 extended from the coils 35 and 36. In the broadcast band which receives, a defogger pattern is separated mostly more electrically than the power supply circuit which heats a defogger, The antenna pattern which connected the defogger pattern with the conductor wire as an antenna which receives AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band, He is trying for the antenna pattern arranged to the center section and the upper flank of the unfilled space part upper part of a defogger pattern and the bottom to fully function as an antenna which receives an FM radio broadcast band, and VHF and a UHF television broadcasting band.

[0024]The circuit 37 is a circuit which takes out an input signal from the antenna pattern which connected the defogger pattern with the conductor wire. The part figure (a1) and part figure (a2) of drawing 2 are a circuit diagram which is connected to the power supply terminal of an ANNATENA pattern, and takes out an input signal through a coaxial cable. In the part figure (a1), the circuit 37 of drawing 1 consists of circuits which consist of the capacity 54. Connect the inner conductor of one end of the coaxial cable 56 to the output terminal of the capacity 54, connect the input terminal of the capacity 54 to the power supply terminal P, connect an outer conductor to the body through the earthing conductor 55, and the outer conductor of the other end of the coaxial cable 56 is set to earth-potentials GND, The input signal Q of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from an inner conductor.

[0025]In the part figure (a2), the circuit 37 of drawing 1 consists of circuits which carried out multiple connection of the capacity 59 to the series connection of the coil 57 and the capacity 58. As for the coil 57, self-resonant frequency puts the thing more than an FM radio broadcast band into one or more piece series, Make high impedance in the frequency more than an FM radio broadcast band, and it is considered as the

coil 57 and the filter which takes out the input signal of an AM radio broadcast band by the series connection of the capacity 58, Capacity 59 is used as the filter which takes out the input signal of the frequency more than an FM radio broadcast band, and outputs the input signal which carried out multiple connection and was compounded from the output terminal. Connect the input terminal of the circuit to the power supply terminal P, connect the inner conductor of one end of the coaxial cable 61 to an output terminal, connect an outer conductor to the body through the earthing conductor 60, and the outer conductor of the other end of the coaxial cable 61 is set to earth-potentials GND, The input signal Q of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from an inner conductor.

[0026]The circuit 37 of drawing 1 comprises a circuit shown in the part figure (a1) or part figure (a2) of drawing 2, and the power supply terminal P and the input signal Q support the power supply terminal 7 and input-signal X_1 in drawing 1. Each constitutes the circuit shown in drawing 2 using a chip, as an example,

the capacity 54 is 10nF, the coils 57 are three chip inductor 1microhenry series connections in 3 microhenries, the capacity 58 is 10nF and the capacity 59 is 100 pF.

[0027]By transceiver measurement on the frequency of an FM radio broadcast band, a VHF television broadcasting band, and a UHF television broadcasting band. The antenna pattern which connected the defogger pattern and the defogger pattern of the flank on the left of [upper part] the unfilled space part with the conductor wire, The antenna pattern of the composition of center feeding the inclination curves of the antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern and receiving sensitivity differ, compensate mutually, and symmetrical [the upper part center section of the unfilled space part of a defogger pattern], and common, The antenna pattern of the composition of the dipole antenna of the bottom center section of the unfilled space part of a defogger pattern tends to compensate the directional characteristics of receiving sensitivity mutually. The antenna pattern of the flank of the upper part left of a defogger pattern and its unfilled space part or the upper part right and the antenna pattern of the center section of the unfilled space part upper part of a defogger pattern or the bottom have a place which inclination curves differ and is compensated mutually.

[0028]In the unfilled space part of the horizontal conductor wire between the conductor wire 5 of an antenna pattern which connected the defogger pattern of drawing 1 with the conductor wire, and the conductor wire 5 and the common electrode 4, and a defogger pattern. The conductor wire 8 of the antenna pattern of an upper part center section, the conductor wires 17 and 21 of the antenna pattern of 11, 9, 12, and a bottom center section, and the conductor wire 25 of the antenna pattern of the flank of the upper part right, By one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and 1/6.2 of the wavelength in the air of length. It uses for the conductor wire of the antenna pattern with high sensitivity with low frequency band VHF_L of VHF television broadcasting, high frequency band VHF_H , and a UHF television broadcasting band by three fourths of the length of the wavelength in the glass of the signal of the frequency near a UHF television broadcasting band, and 3/6.2 of the wavelength in the air of length.

[0029] Each length of the conductor wires 16 and 20 of the antenna pattern of length and a bottom center section which added the conductor wires 9 and 12 of the antenna pattern of an upper part center section in the unfilled space part of the defogger pattern, By one fourth of the length of the wavelength in the glass of the signal of the frequency which is near low frequency band VHF_L of VHF television broadcasting from an FM radio broadcast band, and $1/6.2$ of the wavelength in the air of length. The conductor wire 24 of the antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern, By one fourth of the length of the wavelength in the glass of the signal of the frequency which is near the high frequency band of VHF television broadcasting from an FM radio broadcast band, and $1/6.2$ of the wavelength in the air of length. One fourth of the length of the wavelength in the glass of the signal of the frequency which is near low frequency band VHF_L of VHF television broadcasting from an FM radio broadcast band especially, It can be chosen as $1/6.2$ of the wavelength in the air of length, and uses for the conductor wire of the antenna pattern with high sensitivity with the FM radio broadcast band, and low frequency band VHF_L of VHF television broadcasting and a UHF television broadcasting band.

[0030] The antenna pattern which connected the defogger pattern with the conductor wire, Output input-signal X_1 of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band, and the antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern, Input-signal X_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted, X_1 is made into the input signal of an AM radio broadcast band, and X_1 and X_2 is made into two input signals of diversity carrier trust of an FM radio broadcast band.

[0031] The antenna pattern of an upper part center section and the bottom center section of the unfilled space part of a defogger pattern is outputting input-signal Y_1 of an FM radio broadcast band, and VHF and a UHF television broadcasting band, and Y_2 , respectively. X_1 , X_2 and Y_1 and Y_2 are made into four input signals of diversity carrier trust of VHF and a UHF television broadcasting band.

[0032] As two input signals, an AM radio broadcast band and an FM radio broadcast band, Input-signal X_1 of the antenna pattern which connected the defogger pattern with the conductor wire, input-signal Y_1 of the antenna pattern of an upper part center section or the bottom center section of the unfilled space part of a defogger pattern, or Y_2 can be used.

[0033] The common electrodes 3 and 4 of the both-sides end of a defogger pattern as an example the size of an antenna pattern 39 cm, One upper flat knot is [the 118 cm and 14 flat knot bottom of two or more parallel conductor wires of a ten horizontal graphic display of those with 14 and the horizontal conductor wire between the common electrodes 3 and 4] 146 cm at 1-mm width and 3 cm of intervals.

The common conductor wire 5 of the perpendicular direction of an antenna pattern which connected the left-hand side defogger pattern with the conductor wire is 24 cm, The parallel conductor wire of a four graphic display between 5 and the common electrode 4 by the length containing 23 cm in the unfilled space part of

those with five, and a defogger pattern. In the horizontal conductor wires 8 and 11 of the antenna pattern of an upper part center section, 15 cm, and 9 and 12 at 25 cm. In the conductor wires 16 and 20 of the antenna pattern of 3 cm and a bottom center section with a horizontal interval between each conductor wire of 8, and 9, 11 and 12, 53 cm, and 17 and 21 at 25 cm. The conductor wire 24 of the antenna pattern of the flank of 3 cm and the upper part right with a horizontal interval between each conductor wire of 16, and 17, 20 and 21 is 39 cm, 25 is 25 cm, and the interval of 24 and 25 is 3 cm.

[0034]The horizontal conductor wire 6 of an antenna pattern which connected the defogger pattern with the conductor wire at 18 cm. The interval between 6 and a glass top chord in the unfilled space part of 2.6 cm and a defogger pattern. In the interval between the horizontal conductor wires 8 and 11 of the antenna pattern of an upper part center section, and the conductor wire 2 of one flat knot of a defogger pattern, the conductor wires 10 and 13 of 3 cm and a perpendicular direction at 8.3 cm. In the interval between the conductor wires 16 and 20 of the antenna pattern of 3 cm and a bottom center section with a horizontal interval of 10 and 13, and the conductor wire of 14 flat knots of a defogger pattern, the conductor wires 18 and 22 of 3 cm and a perpendicular direction at 6.5 cm. The interval between the conductor wire 24 of the antenna pattern of the flank of 3 cm and the upper part right with a horizontal interval of 18 and 22 and the conductor wire 2 of one flat knot of a defogger pattern is [the conductor wire 26 of 3 cm and a perpendicular direction] 6 cm, and the interval between 26 and a glass side is 3 cm. The power supply terminals 15, 19, and 23 of each antenna pattern and 27 are 1.2 cm long and a 1.6-cm-wide rectangle, the gap of 19 and 23 is 2.2 cm and the power supply terminal 7 mounts the circuit 37 in 2.4 cm long and a 1.6-cm-wide rectangle.

[0035]Drawing 3 is a lineblock diagram of the 2nd example of the glass antenna for cars of this invention. In contrast with drawing 1, identical codes are functionally attached to the same element. The defogger pattern is formed in the shape of [of the rice field] a character with two or more conductor wires parallel to the horizontal conductor wire 2 to which the common electrodes 3 and 4 of the both-sides end on a glass surface are connected, and the common conductor wire 62 which crosses perpendicularly and carries out common connection to a horizontal conductor wire in the center section.

[0036]The antenna pattern which connected the defogger pattern and the defogger pattern of the flank on the left of [upper part] the unfilled space part with the conductor wire, Composition which the vertical common conductor wire 5 connected to two or more horizontal conductor wires of a defogger pattern like drawing 1, and was connected to the power supply terminal 7 with the horizontal conductor wire 6 parallel to the glass top chord near the window frame of the body is carried out.

The signal wire from the inner conductor of the end of the coaxial cable 40 is connected to the output terminal of the circuit 37 where the input terminal was connected to the power supply terminal 7, The earthing conductor 38 connected to the outer conductor is connected to the body shown by 39, and input-signal X_1 of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor by setting the outer conductor of the other end of the coaxial cable 40 to earth-potentials GND.

[0037]The antenna pattern of the upper part center section of the unfilled space part of a defogger pattern is carrying out symmetrical composition.

A right pattern connects the two conductor wires 63 and 64 with horizontal equal length with the vertical conductor wire 65, It connected with the power supply terminal with the horizontal conductor wire 69 along the lower side of the power supply terminal 70, and the left pattern connected the two conductor wires 66 and 67 with horizontal equal length with the vertical conductor wire 68, and has connected them to the power supply terminal 70 with the horizontal conductor wire 69.

[0038]The conductor wires 63, 64, and 66 and 67 are one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the length of the wavelength in the air, The length which added the conductor wire of 63, and 66, 64 and 67 on either side is one fourth of the length of the wavelength in the glass of the signal of the frequency near low frequency band VHF_L of VHF television broadcasting, and $1/6.2$ of the length of the wavelength in the air from the FM radio broadcast band. Connect the earthing conductor 84 which connects the signal wire 83 from the inner conductor of one end of the coaxial cable 86 to the power supply terminal 70, and is connected to the outer conductor to the body shown by 85, and the outer conductor of the other end of the coaxial cable 86 is set to earth-potentials GND, Input-signal Y_1 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0039]The antenna pattern of the bottom center section of the unfilled space part of a defogger pattern is carrying out symmetrical composition.

A right pattern connects the two conductor wires 71 and 72 with horizontal equal length with the vertical conductor wire 73, It connected with the power supply terminal with the horizontal conductor wire 77 in alignment with the top chord of the power supply terminal 78, and the left pattern connected the two conductor wires 74 and 75 with horizontal equal length with the vertical conductor wire 76, and has connected them to the power supply terminal 78 with the horizontal conductor wire 77.

[0040]The conductor wires 71, 72, and 74 and 75 are one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the length of the wavelength in the air, The length which added the conductor wire of 71, and 74, 72 and 75 on either side is one fourth of the length of the wavelength in the glass of the signal of the frequency near low frequency band VHF_L of VHF television broadcasting, and $1/6.2$ of the length of the wavelength in the air from the FM radio broadcast band. Connect the earthing conductor 88 which connects the signal wire 87 from the inner conductor of one end of the coaxial cable 90 to the power supply terminal 78, and is connected to the outer conductor to the body shown by 89, and the outer conductor of the other end of the

coaxial cable 90 is set to earth-potentials GND, Input-signal Y_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0041]The antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern has connected the two horizontal conductor wires 79 and 80 to the power supply terminal 82 with the conductor wire 81 of a perpendicular direction parallel to the glass side near the window frame of the body. The conductor wires 79 and 80 are one fourth of the length of the wavelength in the glass of the signal of the frequency which has one side near high frequency band VHF_H of VHF television broadcasting from an FM radio broadcast band, and $1/6.2$ of the wavelength in the air of length, Another side is one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length, and the case where the length of the conductor wire of 79 and 80 is equal is shown in the figure. Connect the earthing conductor 92 which connects the signal wire 91 from the inner conductor of one end of the coaxial cable 94 to the power supply terminal 82, and is connected to the outer conductor to the body shown by 93, and the outer conductor of the other end of the coaxial cable 94 is set to earth-potentials GND, Input-signal X_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0042]Input-signal X_1 The input signal of an AM radio broadcast band, X_1 , X_2 is made into two input signals, X_1 , and X_2 and Y_1 of diversity carrier trust of an FM radio broadcast band, and Y_2 is made into four input signals of diversity carrier trust of VHF and a UHF television broadcasting band.

[0043]As two input signals, an AM radio broadcast band and an FM radio broadcast band, Input-signal X_1 of the antenna pattern which connected the defogger pattern with the conductor wire, input-signal Y_1 of the antenna pattern of an upper part center section or the bottom center section of the unfilled space part of a defogger pattern, or Y_2 can be used.

[0044]The common conductor wire 62 of the perpendicular direction of the center section of the defogger pattern of the size of an antenna pattern is 39 cm as an example, The conductor wire between 24 cm, 5, and the common electrode 4 with the vertical horizontal common conductor wire 5 is the length containing 23 cm like [the antenna pattern which connected the left-hand side defogger pattern with the conductor wire] the example of drawing 1, and the horizontal conductor wire 6 is [the interval between 18 cm, and 6 and a glass top chord] 2.6 cm. The antenna pattern of the upper part center section of the unfilled space part of a defogger pattern, In the interval between each conductor wire of 63, and 64, 66 and 67, the conductor wires 65 and 68 of 3 cm and a perpendicular direction at 25 cm at 8.3 cm. [the horizontal conductor wires 63, 64, and 66 and 67] The interval of 65 and 68 is [the interval between 3 cm, the horizontal conductor wires 63 and 66, and the conductor wire 2 of one flat knot of a defogger pattern] 3 cm.

[0045]The antenna pattern of the bottom center section of the unfilled space part of a defogger pattern, In the interval between each conductor wire of 71, and 72, 74 and 75, the conductor wires 73 and 76 of 3 cm and a

perpendicular direction at 25 cm at 6.5 cm. [the horizontal conductor wires 71, 72, and 74 and 75] The interval of Hazama of the conductor wire of the bottom of 3 cm, the horizontal conductor wires 71 and 74, and a defogger pattern with a horizontal interval of 73 and 76 is 3 cm. The antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern, The horizontal conductor wires 79 and 80 are 25 cm, the interval of 79 and 80 is [the conductor wire 81 of 3 cm and a perpendicular direction] 6 cm, and the interval of Hazama of 81 and a glass side is [the interval of Hazama of 3 cm, the horizontal conductor wire 79, and the conductor wire 2 of one flat knot of a defogger pattern] 3 cm.

[0046] Drawing 4 is a lineblock diagram of the 3rd example of the glass antenna for cars of this invention. In contrast with drawing 1 and drawing 3, identical codes are functionally attached to the same element. The defogger pattern is formed in the shape of [of the rice field] a character like drawing 3 with two or more conductor wires parallel to the horizontal conductor wire 2 to which the common electrodes 3 and 4 of the both-sides end on a glass surface are connected, and the common conductor wire 62 which crosses perpendicularly and carries out common connection to a horizontal conductor wire in the center section.

[0047] The antenna pattern which connected the defogger pattern and the defogger pattern of the flank on the right of [upper part] the unfilled space part with the conductor wire is carrying out composition which connected the electrode of the upper part of the common electrode 3 of a defogger pattern to the power supply terminal 96 with the conductor wire 95 of the perpendicular direction parallel to the glass side near the window frame of the body.

The input terminal of the circuit 113 is connected to the power supply terminal 96.

The power supply terminal 96 and the circuit 113 are equivalent to drawing 1, and the power supply terminal 7 and the circuit 37 of drawing 3, and the circuit 113 is constituting the circuit shown in the part figure (a1) or part figure (a2) of drawing 2. Connect the earthing conductor 114 which connects the signal wire from the inner conductor of one end of the coaxial cable 116 to the output terminal of the circuit 113, and is connected to the outer conductor to the body shown by 115, and the outer conductor of the other end of the coaxial cable 116 is set to earth-potentials GND, Input-signal X_1 of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0048] The antenna pattern of the upper part center section of the unfilled space part of a defogger pattern is carrying out symmetrical composition.

A right pattern connects the horizontal conductor wire 97 to the vertical conductor wire 98, It connected with the power supply terminal with the horizontal conductor wire 101 along the lower side of the power supply terminal 102, and the left pattern connected the horizontal conductor wire 99 to the vertical conductor wire 100, and has connected it to the power supply terminal 102 with the horizontal conductor wire 101.

[0049] The conductor wires 97 and 99 are one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length, The length which added the conductor wire of 97 and the right and left of 99 is one fourth of the length of the wavelength in the glass of the signal of the frequency near low frequency

band VHF_L of VHF television broadcasting, and $1/6.2$ of the length of the wavelength in the air from the FM radio broadcast band. Connect the earthing conductor 118 which connects the signal wire 117 from the inner conductor of one end of the coaxial cable 120 to the power supply terminal 102, and is connected to the outer conductor to the body shown by 119, and the outer conductor of the other end of the coaxial cable 120 is set to earth-potentials GND, Input-signal Y_1 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0050]The antenna pattern of the bottom center section of the unfilled space part of a defogger pattern is carrying out symmetrical composition.

A right pattern connects the horizontal conductor wire 103 to the vertical conductor wire 104, It connected with the power supply terminal with the horizontal conductor wire 107 in alignment with the top chord of the power supply terminal 108, and the left pattern connected the horizontal conductor wire 105 to the vertical conductor wire 106, and has connected it to the power supply terminal 108 with the horizontal conductor wire 107.

[0051]The conductor wires 103 and 105 are one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length, The length which added the conductor wire of 103 and the right and left of 105 is one fourth of the length of the wavelength in the glass of the signal of the frequency near low frequency band VHF_L of VHF television broadcasting, and $1/6.2$ of the length of the wavelength in the air from the FM radio broadcast band. Connect the earthing conductor 122 which connects the signal wire 121 from the inner conductor of one end of the coaxial cable 124 to the power supply terminal 108, and is connected to the outer conductor to the body shown by 123, and the outer conductor of the other end of the coaxial cable 124 is set to earth-potentials GND, Input-signal Y_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0052]The antenna pattern of the flank on the left of [upper part] the unfilled space part of a defogger pattern has connected the two horizontal conductor wires 109 and 110 to the power supply terminal 112 with the conductor wire 111 of a perpendicular direction parallel to the glass side near the window frame of the body. The conductor wire 109 is made into one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length. The conductor wires 110 are one fourth of the length of the wavelength in the glass of the signal of the frequency which is near high frequency band VHF_H of VHF television broadcasting from an FM radio broadcast band, and $1/6.2$ of the wavelength in the air of length, One fourth of the length of the wavelength in the glass of the signal of the frequency which is near low frequency band VHF_L of VHF television broadcasting from an FM radio broadcast band especially, and $1/6.2$ of the wavelength in the air of length are used. Connect the earthing conductor 126 which connects the signal wire 125 from the inner

conductor of one end of the coaxial cable 128 to the power supply terminal 112, and is connected to the outer conductor to the body shown by 127, and the outer conductor of the other end of the coaxial cable 128 is set to earth-potentials GND, Input-signal X_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0053] Input-signal X_1 The input signal of an AM radio broadcast band, X_1 , X_2 is made into two input signals, X_1 , and X_2 and Y_1 of diversity carrier trust of an FM radio broadcast band, and Y_2 is made into four input signals of diversity carrier trust of VHF and a UHF television broadcasting band.

[0054] As two input signals, an AM radio broadcast band and an FM radio broadcast band, Input-signal X_1 of the antenna pattern which connected the defogger pattern with the conductor wire, input-signal Y_1 of the antenna pattern of an upper part center section or the bottom center section of the unfilled space part of a defogger pattern, or Y_2 can be used.

[0055] The conductor wire 95 of the perpendicular direction of an antenna pattern to which the size of the antenna pattern connected the right-hand side defogger pattern with the conductor wire as an example is 7 cm, and the interval between 95 and a glass side is 3 cm.

The power supply terminal 96 mounts the circuit 113 in 2.4 cm long and a 1.6-cm-wide rectangle.

The antenna pattern of the upper part center section of the unfilled space part of a defogger pattern, The horizontal conductor wires 97 and 99 are [the conductor wires 98 and 100 of 25 cm and a perpendicular direction] 8.3 cm, and the interval of 98 and 100 is [the interval between 3 cm, the horizontal conductor wires 97 and 99, and the conductor wire 2 of one flat knot of a defogger pattern] 3 cm.

[0056] The antenna pattern of the bottom center section of the unfilled space part of a defogger pattern, The horizontal conductor wires 103 and 105 are [the conductor wires 104 and 106 of 25 cm and a perpendicular direction] 6.5 cm, and the interval between the conductor wires of the bottom of 3 cm, the horizontal conductor wires 103 and 105, and a defogger pattern with a horizontal interval of 104 and 106 is 3 cm. The antenna pattern of the flank on the left of [upper part] the unfilled space part of a defogger pattern, The horizontal conductor wire 109 is 25 cm, 110 is 39 cm, the interval of 109 and 110 is [the conductor wire 111 of 3 cm and a perpendicular direction] 6 cm, and the interval between 111 and a glass side is [the interval between 3 cm, the horizontal conductor wire 109, and the conductor wire 2 of one flat knot of a defogger pattern] 3 cm.

[0057] The antenna pattern of the upper part center section of the defogger pattern, Constitute so that it may have two conductor wires horizontal to right and left at a time like drawing 3, and the conductor wire equivalent to the conductor wires 64 and 67 is made shorter than the length of the conductor wires 97 and 99 equivalent to the conductor wires 63 and 66, For example, so that it may add at 13 cm, or may be made to have two 25-cm horizontal conductor wires at a time right and left like drawing 3 and a conductor wire may not lap with the conductor wire 110 of the antenna pattern of a left flank, Shift and arrange the position of two horizontal conductor wires to a sliding direction, or it is larger than 3 cm in the interval between two horizontal

conductor wires, For example, it may be made 6 cm, or on the whole, it may shift 12 cm on right-hand side, and a few may be arranged on it, for example, and the antenna pattern of the bottom center section of the defogger may be constituted so that it may have two conductor wires horizontal to right and left at a time similarly.

[0058]Drawing 5 is a lineblock diagram of the 4th example of the glass antenna for cars of this invention. In contrast with drawing 1, drawing 3, and drawing 4, identical codes are functionally attached to the same element. The defogger pattern is formed in the shape of [of the rice field] a character like drawing 3 and drawing 4 with two or more conductor wires parallel to the horizontal conductor wire 2 to which the common electrodes 3 and 4 of the both-sides end on a glass surface are connected, and the common conductor wire 62 which crosses perpendicularly and carries out common connection to a horizontal conductor wire in the center section.

[0059]The antenna pattern which connected the defogger pattern and the defogger pattern of the upper part center section of the unfilled space part with the conductor wire is carrying out symmetrical composition. The vertical common conductor wire 129 connects with two or more conductor wires parallel to the horizontal conductor wire 2 of a defogger pattern, and a right pattern is connected to the horizontal conductor wire 130 parallel to the glass top chord near the window frame of the body, It connected with the power supply terminal 131 of the upper part center-section right, and the vertical common conductor wire 132 connected with two or more horizontal conductor wires of a defogger pattern, it connected with the horizontal conductor wire 133 parallel to the glass top chord near the window frame of the body, and the left pattern is connected to the power supply terminal 134 of the upper part center-section left.

[0060]The common conductor wire 129 of the perpendicular direction of a right pattern, Two or more conductor wires between the right-hand side common electrode 3 and the common conductor wire 62 of a center section are divided internally almost equally, common connection is carried out, and the common conductor wire 132 of the perpendicular direction of a left pattern divides internally almost equally two or more conductor wires between the left-hand side common electrode 4 and the common conductor wire 62 of a center section, and is carrying out common connection. The length of the horizontal conductor wire between the common conductor wires 129 and 132 and the common conductor wire 62, and each length of the common conductor wires 129 and 132, One fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting and $1/6.2$ of the wavelength in the air of length are used.

[0061]Each input terminal of the circuit 142 is connected to the power supply terminals 131 and 134, and the signal wire from the inner conductor of the end of the coaxial cable 145 is connected to the output terminal of the circuit 142, The earthing conductor 143 connected to the outer conductor is connected to the body shown by 144, and input-signal X_1 of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor by setting the outer conductor of the other end of the coaxial cable 145 to earth-potentials GND.

[0062]It is connected to the power supply terminal of an antenna pattern, and the part figure (a1) and part figure (a2) of drawing 6 are a circuit diagram which takes out an input signal through a coaxial cable, and constitute the circuit 142 of drawing 5 from a circuit shown in a part figure (a1) or part figure (a2). In a part figure (a1), to power supply terminal P_1 and P_2 corresponding to the power supply terminals 131 and 134 of drawing 5. The input terminal of the capacity 154 and 155 was connected, respectively, and common connection of the output terminal of the capacity 154 and 155 was carried out, it connected with the inner conductor of the end of the coaxial cable 157, and the outer conductor is connected to the body through the earthing conductor 156. It is a filter with which the capacity 154 lets the input signal of the frequency more than an AM radio broadcast band pass, and through and the capacity 155 let the input signal of the frequency more than an FM radio broadcast band pass, The input signal which carried out common connection and was compounded from the output terminal is taken out, and the input signal Q of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from an inner conductor by setting the outer conductor of the other end of the coaxial cable 157 to earth-potentials GND. The earthing conductor 156, the coaxial cable 157, and the input signal Q support the earthing conductor 143 of drawing 5, the coaxial cable 145, and input-signal X_1 , respectively.

[0063]In a part figure (a2), to power supply terminal P_1 corresponding to the power supply terminal 131 of drawing 5. The input terminal of the circuit which carried out multiple connection of the capacity 160 to the series connection of the coil 158 and the capacity 159 is connected, The input terminal of the circuit of the capacity 161 was connected to power supply terminal P_2 corresponding to the power supply terminal 134 of drawing 5, and common connection of the output terminal of each circuit was carried out, it connected with the inner conductor of the end of the coaxial cable 163, and the outer conductor is connected to the body through the earthing conductor 162. It is considered as the coil 158 and the filter which takes out the input signal of an AM radio broadcast band by the series connection of the capacity 159, Use capacity 160 and 161 as the filter which takes out the input signal of the frequency more than an FM radio broadcast band, it takes out the input signal which carried out common connection and was compounded from the output terminal, and sets the outer conductor of the other end of the coaxial cable 163 to earth-potentials GND, The input signal Q of AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from an inner conductor. The earthing conductor 162, the coaxial cable 163, and the input signal Q support the earthing conductor 143 of drawing 5, the coaxial cable 145, and input-signal X_1 , respectively.

[0064]Each constitutes the circuit shown in drawing 6 using a chip, and it is 3 microhenries according [according to / according to / in the capacity 154 and 159 / 10nF / in the capacity 155, 160, and 161 / 100 pF / the coil 158] to three chip inductor 1microhenry series connections as an example.

[0065]The antenna pattern of the bottom center section of the unfilled space part of a defogger pattern is constituting the symmetrical dipole antenna from drawing 5 like drawing 1.

The right pattern connected the two horizontal conductor wires 16 and 17 to the power supply terminal 19 with the vertical conductor wire 18, and the left pattern has connected the two horizontal conductor wires 20

and 21 to the power supply terminal 23 with the vertical conductor wire 22.

The signal wires 45 and 46 from the inner conductor and outer conductor of an end of the coaxial cable 49 are connected to the power supply terminals 19 and 23, respectively, The earthing conductor 47 connected to the outer conductor is connected to the body shown by 48, and input-signal Y_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor by setting the outer conductor of the other end of the coaxial cable 49 to earth-potentials GND.

[0066]The antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern, The horizontal conductor wire 135 is connected to the power supply terminal 137 with the conductor wire 136 of a perpendicular direction parallel to the glass side near the window frame of the body, The conductor wire 135 is made into one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length. Connect the earthing conductor 147 which connects the signal wire 146 from the inner conductor of one end of the coaxial cable 149 to the power supply terminal 137, and is connected to the outer conductor to the body shown by 148, and the outer conductor of the other end of the coaxial cable 149 is set to earth-potentials GND, Input-signal Y_1 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0067]The antenna pattern of the flank on the left of [upper part] the unfilled space part of a defogger pattern has connected the two horizontal conductor wires 138 and 139 to the power supply terminal 141 with the conductor wire 140 of a perpendicular direction parallel to the glass side near the window frame of the body. One fourth of the length of the wavelength in the glass of the signal of the frequency which has the conductor wire 138 near high frequency band VHF_H of VHF television broadcasting from an FM radio broadcast band, $1/6.2$ of the length of the wavelength in the air is used, and the conductor wire 139 is made into one fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length. Connect the earthing conductor 151 which connects the signal wire 150 from the inner conductor of one end of the coaxial cable 153 to the power supply terminal 141, and is connected to the outer conductor to the body shown by 152, and the outer conductor of the other end of the coaxial cable 153 is set to earth-potentials GND, Input-signal X_2 of an FM radio broadcast band, and VHF and a UHF television broadcasting band is outputted from the inner conductor.

[0068]Input-signal X_1 The input signal of an AM radio broadcast band, X_1 , X_2 is made into two input signals, X_1 , and X_2 and Y_1 of diversity carrier trust of an FM radio broadcast band, and Y_2 is made into four input signals of diversity carrier trust of VHF and a UHF television broadcasting band.

[0069]As two input signals, an AM radio broadcast band and an FM radio broadcast band, input-signal X_1 of the antenna pattern which connected the defogger pattern with the conductor wire, and input-signal Y_2 of the

antenna pattern of the bottom center section of the unfilled space part of a defogger pattern can be used. [0070]The common conductor wires 129 and 132 of the perpendicular direction of an antenna pattern to which the size of the antenna pattern connected the defogger pattern of the upper part center section with the conductor wire as an example are 24 cm, By 129 and the length which contains 23 cm between the common conductor wires 62 of 132 and a center section, the parallel conductor wire of a four graphic display is with five, the horizontal conductor wires 130 and 133 are 18 cm, and the interval between glass top chords is 2.6 cm.

The power supply terminals 131 and 134 are 1.2 cm long and a 1.6-cm-wide rectangle, and the gap between the power supply terminals of 131 and 134 is 2.2 cm, and they mount the circuit 142.

The antenna pattern of the bottom center section of the unfilled space part of a defogger pattern, In the horizontal conductor wires 16 and 20, 53 cm, and 17 and 21 like the example of drawing 1 at 25 cm. The interval between each conductor wire of 16, and 17, 20 and 21 is [the conductor wires 18 and 22 of 3 cm and a perpendicular direction] 6.5 cm, and the interval between the conductor wires of the bottom of 3 cm, the horizontal conductor wires 16 and 20, and a defogger pattern with a horizontal interval of 18 and 22 is 3 cm.

[0071]The conductor wire 135 with a horizontal antenna pattern of the flank on the right of [upper part] the unfilled space part of a defogger pattern is 20 cm, the interval between the conductor wires 2 of one flat knot of 135 and a defogger pattern is [the conductor wire 136 of 3 cm and a perpendicular direction] 6 cm, and the interval between 136 and a glass side is 3 cm. The antenna pattern of the flank on the left of [upper part] the unfilled space part of a defogger pattern, The horizontal conductor wire 138 is 35 cm, 139 is 25 cm, the interval of 138 and 139 is [the conductor wire 140 of 3 cm and a perpendicular direction] 6 cm, and the interval between 140 and a glass side is [the interval between 3 cm, the horizontal conductor wire 138, and the conductor wire 2 of one flat knot of a defogger pattern] 3 cm.

[0072]The antenna pattern which connected the defogger pattern of the upper part center section with the conductor wire can consist of one patterns of the right or the left. Constitute from the vertical common conductor wire 129, the horizontal conductor wire 130, and the power supply terminal 131 equivalent to the pattern on the right of drawing 5, and the power supply terminal 131 as a rectangle of 1.6 cm long and 2.4 cm wide, The part figure (a1) of drawing 2 or the circuit of the composition of a part figure (a2) as well as the circuit 37 of drawing 1 is mounted, The signal wire from the inner conductor of the end of the coaxial cable equivalent to the coaxial cable 145 is connected to the output terminal of the circuit, The earthing conductor connected to the outer conductor is connected to the body shown by 144, and input-signal X_1 is outputted from an inner conductor by setting the outer conductor of the other end of a coaxial cable to earth-potentials GND. A coaxial cable may not be arranged on right-hand side like the coaxial cable 145 of a graphic display, but may be arranged on left-hand side with the coaxial cable 153.

[0073]When the antenna pattern which connected the defogger pattern with the conductor wire is constituted on the upper part center-section right, The horizontal conductor wire 138 of the antenna pattern of the flank on the left of [upper part] the unfilled space part of a defogger pattern, One fourth of the length of the

wavelength in the glass of the signal of the frequency which is near low frequency band VHF_L of VHF television broadcasting from an FM radio broadcast band, and $1/6.2$ of the wavelength in the air of length are used, and it can choose from the length up to 53 cm for a long time than 35 cm.

[0074]The power source wire 29 of the circuit 28 of the choke coil shown by identical codes by [drawing 1](#), [drawing 3](#), [drawing 4](#), and [drawing 5](#), The earthing conductor which connects with the body which length shows by 7 cm or less 30, connects the signal wire from the inner conductor of the end of a coaxial cable to the power supply terminal of an antenna, for example by a length of 3 cm, and is connected to the outer conductor is connected to the body by a length of 15 cm.

[0075]With the glass antenna for cars of this invention explained in the 1st - the 4th example above. It is in a center section, or the upper right and the left flank of the unfilled space part upper part of a defogger pattern, and the bottom, By one fourth of the length of the wavelength in the glass of the signal of the frequency which is near high frequency band VHF_H of VHF television broadcasting from an FM radio broadcast band, and $1/6.2$ of the wavelength in the air of length. From an FM radio broadcast band, with low frequency band VHF_L of VHF television broadcasting, and a UHF television broadcasting band the conductor wire of an antenna pattern with high sensitivity, For example, it was chosen as a length of 53-25 cm, and is especially chosen out of the FM radio broadcast band as a length of 53-35 cm, for example as one fourth of the length of the wavelength in the glass of the signal of the frequency near low frequency band VHF_L of VHF television broadcasting, and $1/6.2$ of the wavelength in the air of length.

[0076]One fourth of the length of the wavelength in the glass of the signal of the frequency near high frequency band VHF_H of VHF television broadcasting, By three fourths of the length of the wavelength in $1/6.2$ of the wavelength in the air of length, or the glass of the signal of the frequency near a UHF television broadcasting band, and $3/6.2$ of the wavelength in the air of length. The conductor wire of the antenna pattern with high sensitivity is chosen as a length of 25-13 cm with the VHF television broadcasting band and the UHF television broadcasting band, for example.

[0077]The antenna pattern which receives AM, an FM radio broadcast band, and VHF and a UHF television broadcasting band and which connected the defogger pattern with the conductor wire, It is good also as an antenna pattern which connected the defogger pattern of the shape of KO shown in [drawing 7](#) besides the defogger pattern of the shape of the rice field shown in the defogger pattern of the shape of the day shown in [drawing 1](#), [drawing 3](#), [drawing 4](#), and [drawing 5](#) with the conductor wire.

[0078]The input signal of an antenna pattern which furthermore connected the defogger pattern with the conductor wire is made into X_1 . Four antenna patterns are arranged to a center section, or the upper right and the left flank of the unfilled space part upper part of a defogger pattern, and the bottom, The input signal of the antenna pattern which has one fourth of the conductor wires of length of the wavelength in the glass of the signal of the frequency near the high frequency band of one fourth of the conductor wires of length and VHF television broadcasting of the wavelength in the glass of the signal of the frequency which is near the

high frequency band of VHF television broadcasting from an FM radio broadcast band. The input signal of other three antenna patterns which have one fourth of the conductor wires of length of the wavelength in the glass of the signal of the frequency which considers it as X_2 and is near the high frequency band of VHF television broadcasting as Y_1 , Y_2 , and Y_3 . The input signal of an AM radio broadcast band, X_1 , and X_2 for X_1 . One of two input signals of diversity carrier trust of an FM radio broadcast band, X_1 , or the X_2 . It is good also considering Y_1 , Y_2 , and Y_3 as four input signals of diversity carrier trust of VHF and a UHF television broadcasting band.

[0079]

[Effect of the Invention]The glass antenna for cars of this invention the antenna pattern which connected the defogger pattern with the conductor wire AM, From an FM radio broadcast band, use VHF and a UHF television broadcasting band as one antenna to receive, and The unfilled space part upper part of a defogger pattern, and a lower center section, Two or more antenna patterns are arranged to the flank of the upper right and left, and two antennas of diversity carrier trust of an FM radio broadcast band and four antennas of diversity carrier trust of VHF and a UHF television broadcasting band are constituted.

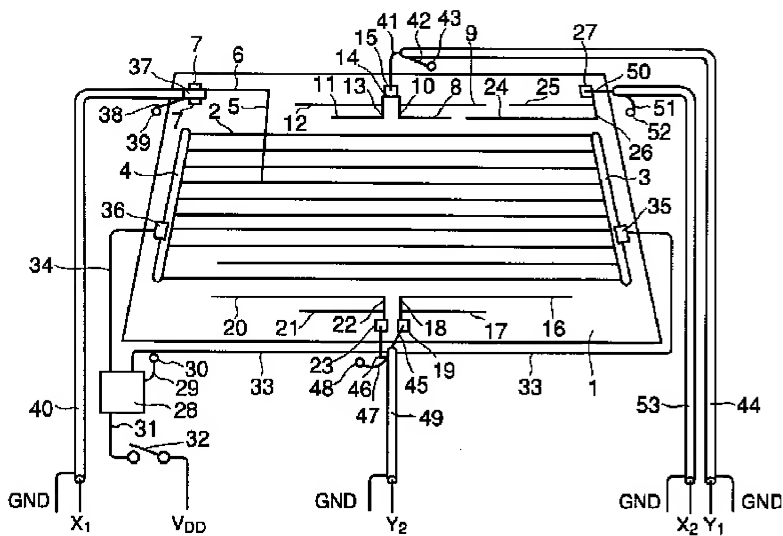
[0080]Two or more antenna patterns of the unfilled space part of a defogger pattern, It has a conductor wire of one fourth of the length of the wavelength in the glass of the signal of the frequency near the high frequency band of VHF television broadcasting, By high sensitivity, receive and VHF and a UHF television broadcasting band in two or more of the antenna patterns, There is an antenna pattern which has a conductor wire of one fourth of the length of the wavelength in the glass of the signal of the frequency which is furthermore near the high frequency band of VHF television broadcasting from an FM radio broadcast band, and VHF and a UHF television broadcasting band are received from an FM radio broadcast band.

[0081]The antenna pattern which connected the defogger pattern with the conductor wire, and two or more antenna patterns of the unfilled space part of a defogger pattern, The spacial configurations to the glass surface top of an antenna differ, respectively, an FM radio broadcast band compensates directional characteristics with two antenna patterns, and VHF and a UHF television broadcasting band compensate directional characteristics with four antenna patterns, and receive them good in every direction of a car.

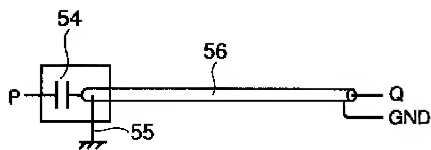
[0082]The input signal of an antenna pattern which connected the defogger pattern with the conductor wire, It inputs into the circuit mounted on the glass surface, and outputs through capacity, or it has capacity, and is compounding and outputting through the filter which takes out the input signal of an AM radio broadcast band, and the filter which takes out the input signal of the frequency more than an FM radio broadcast band.

[0083]Since all input signals are outputted from on a rear glass surface, each coaxial cable is packed between receivers and it has composition which signal processing of a diversity tends to carry out.

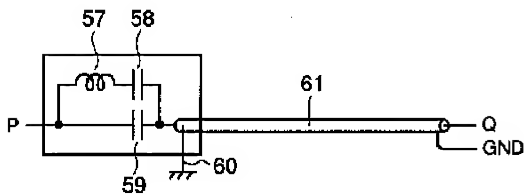
[Translation done.]



DRAWING 1

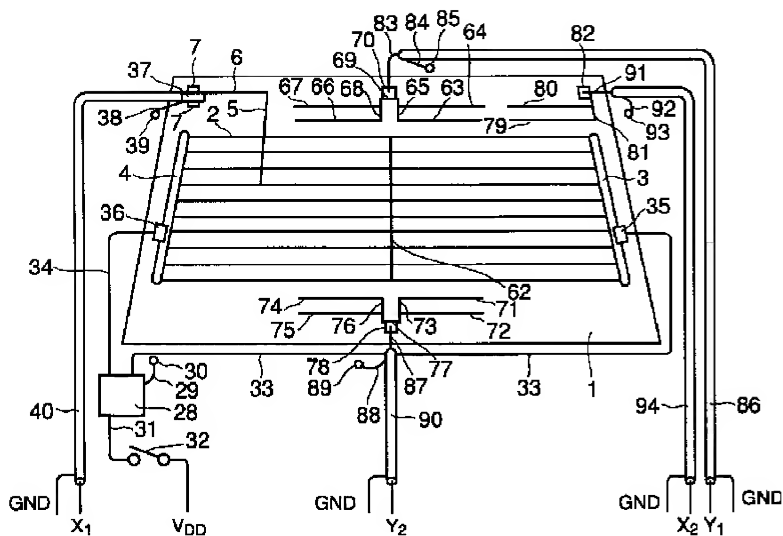


(a1)

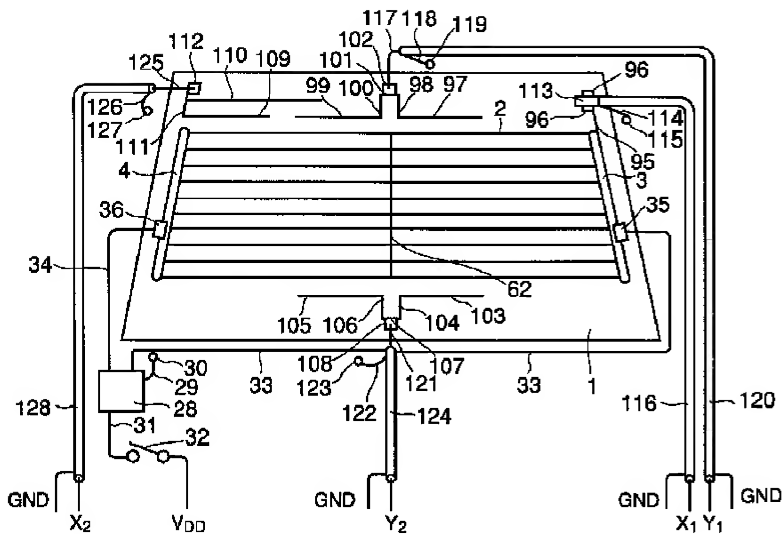


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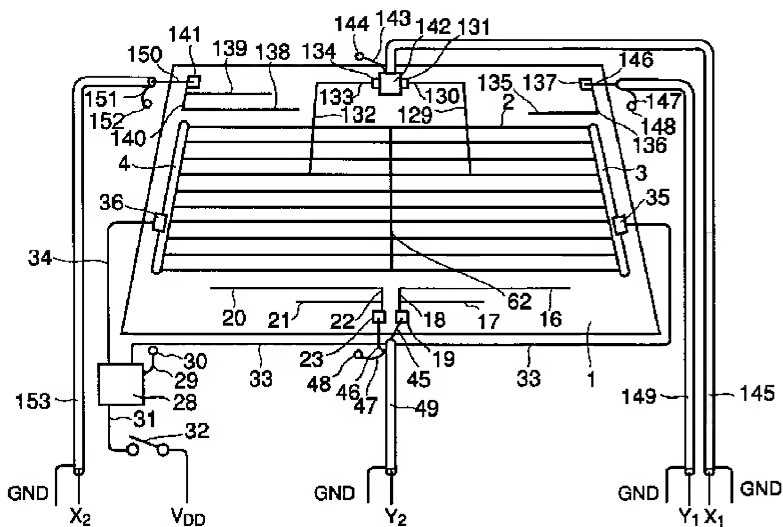
DRAWING 2



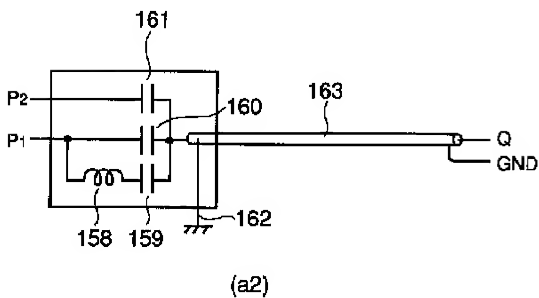
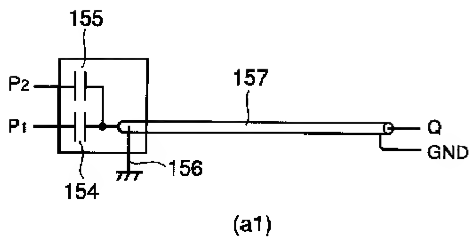
DRAWING 3



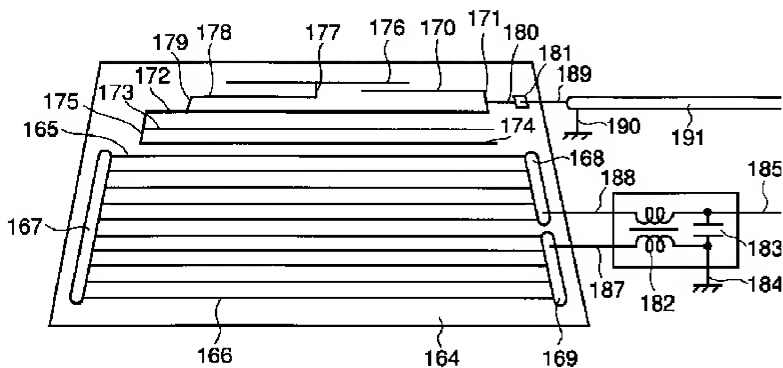
DRAWING 4



DRAWING 5



DRAWING 6



DRAWING 7